

USB Extenders


Twisted Pair Extender for USB Peripherals




Extron® Electronics
INTERFACING, SWITCHING AND CONTROL

Precautions

Safety Instructions • English

- 


This symbol is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.
- 


This symbol is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.

Caution

- Read Instructions** • Read and understand all safety and operating instructions before using the equipment.
- Retain Instructions** • The safety instructions should be kept for future reference.
- Follow Warnings** • Follow all warnings and instructions marked on the equipment or in the user information.
- Avoid Attachments** • Do not use tools or attachments that are not recommended by the equipment manufacturer because they may be hazardous.

Consignes de Sécurité • Français

- 


Ce symbole sert à avertir l'utilisateur que la documentation fournie avec le matériel contient des instructions importantes concernant l'exploitation et la maintenance (réparation).
- 


Ce symbole sert à avertir l'utilisateur de la présence dans le boîtier de l'appareil de tensions dangereuses non isolées posant des risques d'électrocution.

Attention

- Lire les instructions**• Prendre connaissance de toutes les consignes de sécurité et d'exploitation avant d'utiliser le matériel.
- Conserver les instructions**• Ranger les consignes de sécurité afin de pouvoir les consulter à l'avenir.
- Respecter les avertissements** • Observer tous les avertissements et consignes marqués sur le matériel ou présentés dans la documentation utilisateur.

Sicherheitsanleitungen • Deutsch

- 


Dieses Symbol soll dem Benutzer in der im Lieferumfang enthaltenen Dokumentation besonders wichtige Hinweise zur Bedienung und Wartung (Instandhaltung) geben.
- 


Dieses Symbol soll den Benutzer darauf aufmerksam machen, daß im Inneren des Gehäuses dieses Produktes gefährliche Spannungen, die nicht isoliert sind und die einen elektrischen Schock verursachen können, herrschen.

Achtung

- Lesen der Anleitungen** • Bevor Sie das Gerät zum ersten Mal verwenden, sollten Sie alle Sicherheits- und Bedienungsanleitungen genau durchlesen und verstehen.
- Aufbewahren der Anleitungen** • Die Hinweise zur elektrischen Sicherheit des Produktes sollten Sie aufbewahren, damit Sie im Bedarfsfall darauf zurückgreifen können.
- Befolgen der Warnhinweise** • Befolgen Sie alle Warnhinweise und Anleitungen auf dem Gerät oder in der Benutzerdokumentation.
- Keine Zusatzgeräte** • Verwenden Sie keine Werkzeuge oder Zusatzgeräte, die nicht ausdrücklich vom Hersteller empfohlen wurden, da diese eine Gefahrenquelle darstellen können.

Instrucciones de seguridad • Español

- 


Este símbolo se utiliza para advertir al usuario sobre instrucciones importantes de operación y mantenimiento (o cambio de partes) que se desean destacar en el contenido de la documentación suministrada con los equipos.
- 


Este símbolo se utiliza para advertir al usuario sobre la presencia de elementos con voltaje peligroso sin protección aislante, que puedan encontrarse dentro de la caja o alojamiento del producto, y que puedan representar riesgo de electrocución.

Precaucion

- Leer las instrucciones** • Leer y analizar todas las instrucciones de operación y seguridad, antes de usar el equipo.
- Conservar las instrucciones** • Conservar las instrucciones de seguridad para futura consulta.
- Obedecer las advertencias** • Todas las advertencias e instrucciones marcadas en el equipo o en la documentación del usuario, deben ser obedecidas.

安全须知 • 中文

- 

这个符号提示用户该设备用户手册中有重要的操作和维护说明。
- 

这个符号警告用户该设备机壳内有暴露的危险电压，有触电危险。

注意

- 阅读说明书** • 用户使用该设备前必须阅读并理解所有安全和使用说明。
- 保存说明书** • 用户应保存安全说明书以备将来使用。
- 遵守警告** • 用户应遵守产品和用户指南上的所有安全和操作说明。
- 避免追加** • 不要使用该产品厂商没有推荐的工具或追加设备，以避免危险。

Warning

- Power sources** • This equipment should be operated only from the power source indicated on the product. This equipment is intended to be used with a main power system with a grounded (neutral) conductor. The third (grounding) pin is a safety feature, do not attempt to bypass or disable it.
- Power disconnection** • To remove power from the equipment safely, remove all power cords from the rear of the equipment, or the desktop power module (if detachable), or from the power source receptacle (wall plug).
- Power cord protection** • Power cords should be routed so that they are not likely to be stepped on or pinched by items placed upon or against them.
- Servicing** • Refer all servicing to qualified service personnel. There are no user-serviceable parts inside. To prevent the risk of shock, do not attempt to service this equipment yourself because opening or removing covers may expose you to dangerous voltage or other hazards.
- Slots and openings** • If the equipment has slots or holes in the enclosure, these are provided to prevent overheating of sensitive components inside. These openings must never be blocked by other objects.
- Lithium battery** • There is a danger of explosion if battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

- Eviter les pièces de fixation** • Ne pas utiliser de pièces de fixation ni d'outils non recommandés par le fabricant du matériel car cela risquerait de poser certains dangers.

Avertissement

- Alimentations** • Ne faire fonctionner ce matériel qu'avec la source d'alimentation indiquée sur l'appareil. Ce matériel doit être utilisé avec une alimentation principale comportant un fil de terre (neutre). Le troisième contact (de mise à la terre) constitue un dispositif de sécurité : n'essayez pas de la contourner ni de la désactiver.
- Déconnexion de l'alimentation** • Pour mettre le matériel hors tension sans danger, déconnectez tous les cordons d'alimentation de l'arrière de l'appareil ou du module d'alimentation de bureau (s'il est amovible) ou encore de la prise secteur.
- Protection du cordon d'alimentation** • Acheminer les cordons d'alimentation de manière à ce que personne ne risque de marcher dessus et à ce qu'ils ne soient pas écrasés ou pincés par des objets.
- Réparation-maintenance** • Faire exécuter toutes les interventions de réparation-maintenance par un technicien qualifié. Aucun des éléments internes ne peut être réparé par l'utilisateur. Afin d'éviter tout danger d'électrocution, l'utilisateur ne doit pas essayer de procéder lui-même à ces opérations car l'ouverture ou le retrait des couvercles risquent de l'exposer à de hautes tensions et autres dangers.
- Fentes et orifices** • Si le boîtier de l'appareil comporte des fentes ou des orifices, ceux-ci servent à empêcher les composants internes sensibles de surchauffer. Ces ouvertures ne doivent jamais être bloquées par des objets.
- Lithium Batterie** • Il a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un ype équivalent recommandé par le constructeur. Mettre au reut les batteries usagées conformément aux instructions du fabricant.

Vorsicht

- Stromquellen** • Dieses Gerät sollte nur über die auf dem Produkt angegebene Stromquelle betrieben werden. Dieses Gerät wurde für eine Verwendung mit einer Hauptstromleitung mit einem geerdeten (neutralen) Leiter konzipiert. Der dritte Kontakt ist für einen Erdschluß, und stellt eine Sicherheitsfunktion dar. Diese sollte nicht umgangen oder außer Betrieb gesetzt werden.
- Stromunterbrechung** • Um das Gerät auf sichere Weise vom Netz zu trennen, sollten Sie alle Netzkabel aus der Rückseite des Gerätes, aus der externen Stromversorgung (falls dies möglich ist) oder aus der Wandsteckdose ziehen.
- Schutz des Netzkabels** • Netzkabel sollten stets so verlegt werden, daß sie nicht im Weg liegen und niemand darauf treten kann oder Objekte darauf- oder unmittelbar dagegengestellt werden können.
- Wartung** • Alle Wartungsmaßnahmen sollten nur von qualifiziertem Servicepersonal durchgeführt werden. Die internen Komponenten des Gerätes sind wartungsfrei. Zur Vermeidung eines elektrischen Schocks versuchen Sie in keinem Fall, dieses Gerät selbst öffnen, da beim Entfernen der Abdeckungen die Gefahr eines elektrischen Schlags und/oder andere Gefahren bestehen.
- Schlitze und Öffnungen** • Wenn das Gerät Schlitze oder Löcher im Gehäuse aufweist, dienen diese zur Vermeidung einer Überhitzung der empfindlichen Teile im Inneren. Diese Öffnungen dürfen niemals von anderen Objekten blockiert werden.
- Litium-Batterie** • Explosionsgefahr, falls die Batterie nicht richtig ersetzt wird. Ersetzen Sie verbrauchte Batterien nur durch den gleichen oder einen vergleichbaren Batterietyp, der auch vom Hersteller empfohlen wird. Entsorgen Sie verbrauchte Batterien bitte gemäß den Herstelleranweisungen.

- Evitar el uso de accesorios** • No usar herramientas o accesorios que no sean específicamente recomendados por el fabricante, ya que podrían implicar riesgos.

Advertencia

- Alimentación eléctrica** • Este equipo debe conectarse únicamente a la fuente/tipo de alimentación eléctrica indicada en el mismo. La alimentación eléctrica de este equipo debe provenir de un sistema de distribución general con conductor neutro a tierra. La tercera pata (puesta a tierra) es una medida de seguridad, no puentearla ni eliminarla.
- Desconexión de alimentación eléctrica** • Para desconectar con seguridad la acometida de alimentación eléctrica al equipo, desenchufar todos los cables de alimentación en el panel trasero del equipo, o desenchufar el módulo de alimentación (si fuera independiente), o desenchufar el cable del receptáculo de la pared.
- Protección del cables de alimentación** • Los cables de alimentación eléctrica se deben instalar en lugares donde no sean pisados ni apretados por objetos que se puedan apoyar sobre ellos.
- Reparaciones/mantenimiento** • Solicitar siempre los servicios técnicos de personal calificado. En el interior no hay partes a las que el usuario deba acceder. Para evitar riesgo de electrocución, no intentar personalmente la reparación/mantenimiento de este equipo, ya que al abrir o extraer las tapas puede quedar expuesto a voltajes peligrosos u otros riesgos.
- Ranuras y aberturas** • Si el equipo posee ranuras o orificios en su caja/alojamiento, es para evitar el sobrecalentamiento de componentes internos sensibles. Estas aberturas nunca se deben obstruir con otros objetos.
- Batería de litio** • Existe riesgo de explosión si esta batería se coloca en la posición incorrecta. Cambiar esta batería únicamente con el mismo tipo (o su equivalente) recomendado por el fabricante. Desachar las baterías usadas siguiendo las instrucciones del fabricante.

警告

- 电源** • 该设备只能使用产品上标明的电源。设备必须使用有地线的供电系统供电。第三条线（地线）是安全设施，不能不用或跳过。
- 拔掉电源** • 为安全地从设备拔掉电源，请拔掉所有设备后或桌面电源的电源线，或任何接到市电系统的电源线。
- 电源线保护** • 妥善布线，避免被踩踏，或重物挤压。
- 维护** • 所有维修必须由认证的维修人员进行。设备内部没有用户可以更换的零件。为避免出现触电危险不要自己试图打开设备盖子维修设备。
- 通风孔** • 有些设备机壳上有通风槽或孔，它们是用来防止机内敏感元件过热。不要用任何东西挡住通风孔。
- 锂电池** • 不正确的更换电池会有爆炸的危险。必须使用与厂家推荐的相同或相近型号的电池。按照生产厂的建议处理废弃电池。

FCC Class A Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

The Class A limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

NOTE: This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance with FCC emissions limits.

For more information on safety guidelines, regulatory compliances, EMI/EMF compliance, accessibility, and related topics, [click here](#).

Conventions Used in this Guide

Notifications

In this user guide, the following are used:

CAUTION: A caution indicates a potential hazard to equipment or data.

NOTE: A note draws attention to important information.

TIP: A tip provides a suggestion to make working with the application easier.

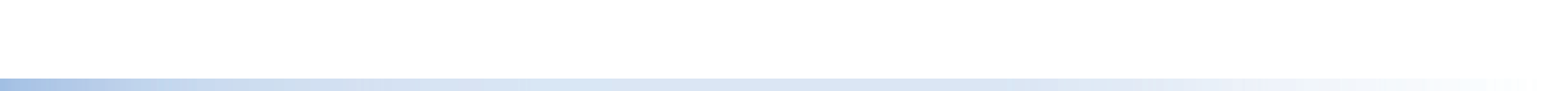
WARNING: A warning warns of things or actions that might cause injury, death, or other severe consequences.

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Trademarks

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Contents

Introduction	1	Reference Information	13
About this User Guide.....	1	Specifications.....	13
About the USB Extender Tx/Rx	2	Part Numbers and Accessories.....	15
TP Cable Advantages	3	Included Parts	15
Features.....	3	Accessories	15
Installation and Operation	4	TP Cable Termination	16
Installation Overview.....	4	Mounting the USB Extender.....	17
Mounting Options Overview	5	Tabletop Placement.....	17
Connections	6	Rack Mounting	17
Transmitter Rear Panel.....	6	Under-furniture Mounting.....	18
Receiver Rear Panel	7	Through-furniture Mounting	18
Operation	8	Projector Mounting.....	18
Transmitter Front Panel Indicators.....	8	Wall mounting	19
Receiver Front Panel Indicators	9		
Cabling and Setup	10		
System Operation	12		
Troubleshooting	12		

Introduction

This section provides an overview of the guide and the product. The following topics are discussed:

- **About this User Guide**
- **About the USB Extender Tx/Rx**
- **TP Cable Advantages**
- **Features**

About this User Guide

This user guide contains information to install, configure, and operate the Extron Electronics USB Extender Tx/Rx, USB Extender AAP Tx/Rx, and the USB Extender D (Decora®) Tx/Rx transmitter and receiver.

Additional information can be found on the Extron Electronics website at www.extron.com.

In this guide the term “Tx/Rx” or “extender” refers to the rack mountable (USB Extender Tx/Rx), AAP, and D products and to both the transmitter and the receiver. Where differences exist, they are noted.

About the USB Extender Tx/Rx

The USB Extender Tx/Rx is a family of USB transmitters and receivers in enclosures supporting a variety of mounting options. A transmitter and receiver extend the distance of USB data over a single Category (CAT) 5 (or better) unshielded twisted pair (UTP) or shielded twisted pair (STP) cable. The USB signals can be transmitted up to 450 feet (135 m) using these cables.

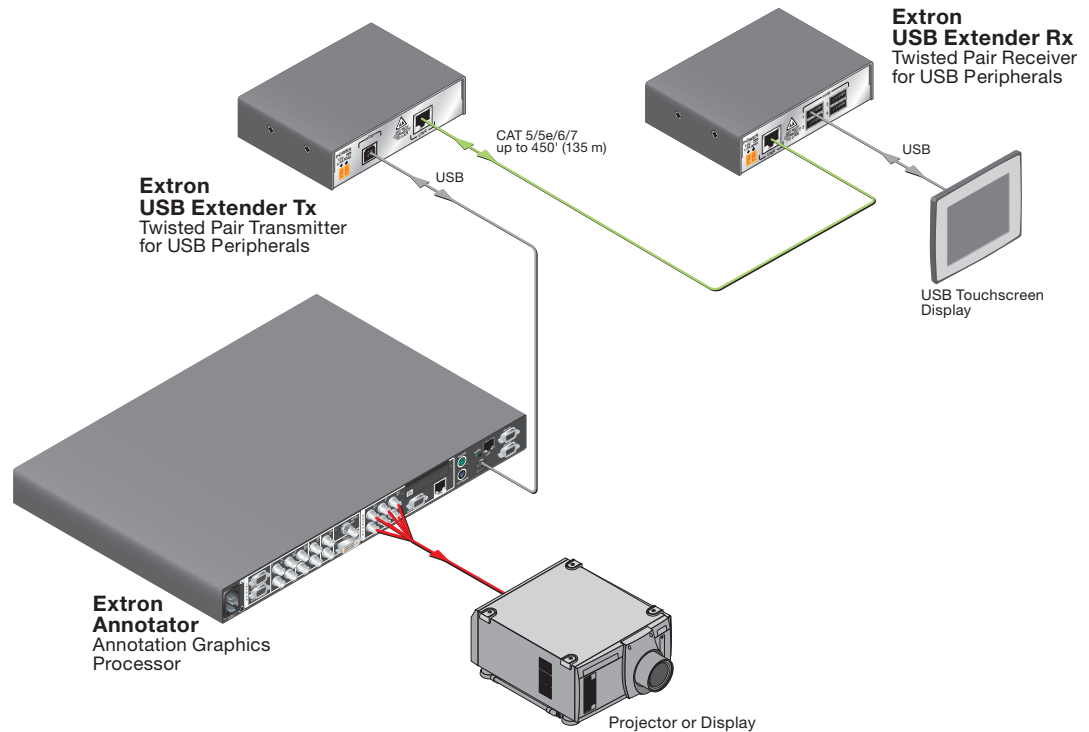


Figure 1. Typical Transmitter and Receiver Application

A USB Extender system consists of a transmitter (Tx) and a receiver (Rx). The transmitter connects directly to a USB port on a PC or USB host. The receiver features a four port USB hub to connect multiple peripheral devices. The USB Extender Tx/Rx, AAP Tx/Rx, and Decora Tx/Rx transmitters and receivers can be mixed to accommodate applications that may require both rack mountable and architectural USB Extenders.

The USB Extender series complies with the USB 2.0 standard, supporting USB 2.0 (480 Mbps high speed), USB 1.1 (12 Mbps full speed), and USB 1.0 (1.5 Mbps low speed) for data transmission throughout the system. It also supplies +5 VDC (up to 500 mA) of power on each of the receiver USB peripheral ports.

Both transmitter and receiver feature a front panel USB host activity LED, power indicator, and a twisted pair Link LED for local or remote troubleshooting.

The USB Extenders are in 3 inches deep, quarter rack width, 1 inch high metal enclosures. They can be set on a tabletop or mounted in a rack, under or through furniture, or to a projector pole.

The USB Extender AAP and USB Extender D are in a 1.4 inches deep, two-space plate size enclosure.

The USB Extender AAPs fit into all Cable Cubby® applications, the Hideaway® HSA 400/402 and HSA 822/822MS (bottom slot only), and the AVTrac® 482 Series.

TP Cable Advantages

Twisted pair cable is much smaller, lighter, more flexible, and less expensive than USB cable. These transmitter and receiver twisted pair (TP) products make cable runs simpler and less cumbersome. Termination of the cable with RJ-45 connectors is simple, quick, and economical.

NOTE: The transmitter and receiver pair work with unshielded twisted pair (UTP) or shielded twisted pair (STP) cables; but to ensure FCC Class A and CE compliance, STP cables are required.

Features

- **Transmits USB signals over CAT 5/5e/6/7 cables** — Standard twisted pair cables provide an economical, easily installed cable solution.
- **Long distance transmission** — CAT 5/5e/6/7 UTP/STP cable up to 450 feet (135 m) can be used.
- **One inch high, quarter rack width, metal enclosures** — With low profile enclosures, transmitters and receivers can be discreetly installed in locations such as behind a plasma or LCD flat-panel display.
- **External 100 VAC to 240 VAC, 50-60 Hz, international power supply** — Included with each transmitter and each receiver.
- **USB Extender AAP and Decora Tx/Rx** — The AAP and Decora versions have an RJ-45 rear connector in a single gang plate size enclosure.

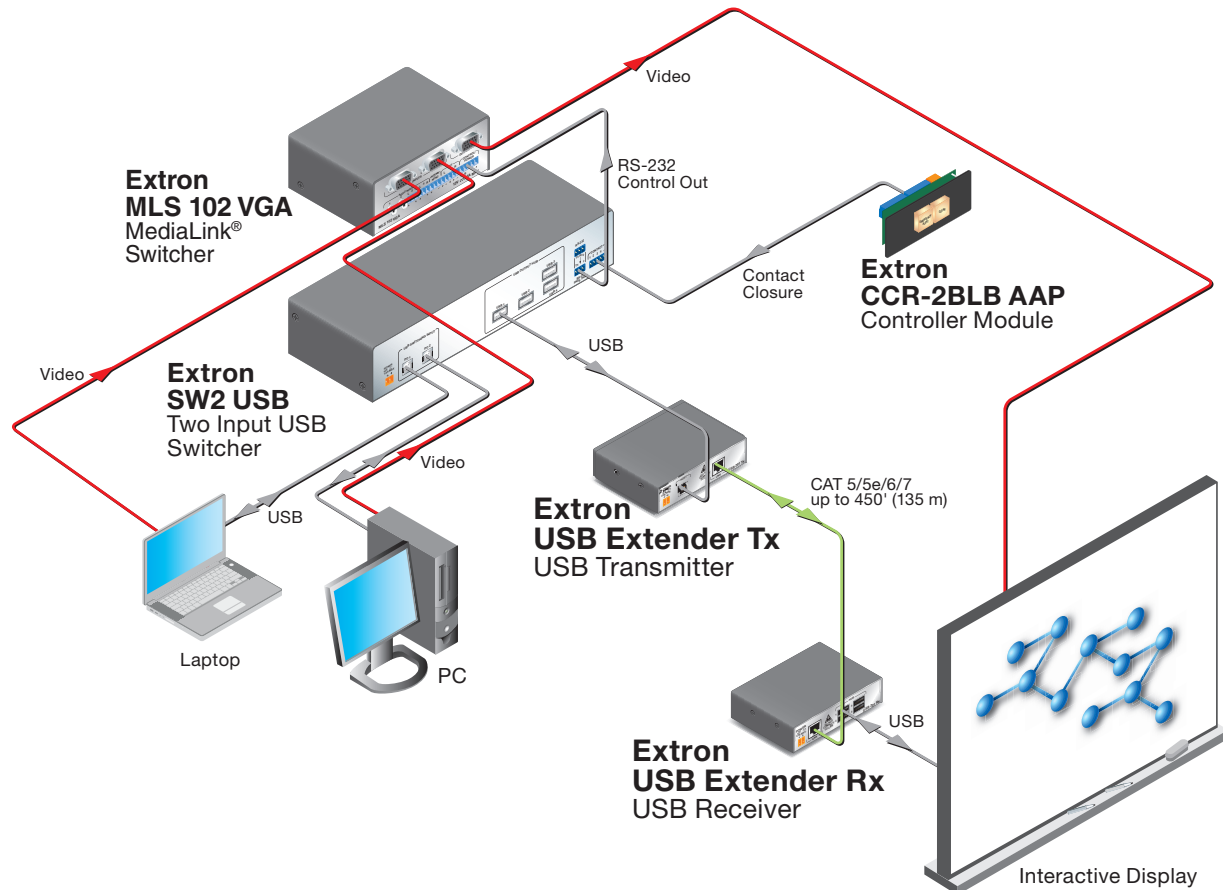


Figure 2. USB Extender Application Diagram

Installation and Operation

This section provides the following details:

- [Installation Overview](#)
- [Mounting Options Overview](#)
- [Connections](#)
- [Operation](#)
- [Troubleshooting](#)

Installation Overview

Install and set up the USB Extender series as follows:

1. Shut off power to all devices that will be directly connected to the USB Extender transmitter or receiver.
2. Choose a location and mount the transmitter and receiver.
 - If rack mounting, fasten the cabinet to the rack.
 - If furniture mounting, install the mounting brackets (not included), then fasten the brackets to the furniture.
 - If wall mounting an AAP or Decora model, install the wall box. Do not mount the unit.

Consult the instructions that accompany the selected mounting option for further details.
3. Run a twisted pair cable between the LINK ports of the transmitter and receiver.
4. Connect an external power supply to the transmitter and another to the receiver. If the PC or laptop can supply USB power, the external transmitter supply is not required.
5. Apply power to the USB extenders. If external supplies are used with the transmitter and receiver, both power LEDs and both LINK LEDs light to indicate proper link cable connection between the transmitter and receiver. If the connected PC is using supplying power to the transmitter, only the Rx power LED lights at this time.
6. Connect the PC (or other USB host device) to the USB Extender transmitter using an appropriate USB 2.0 compatible Type A-B cable (Type A to mini Type B for the AAP and D models).
7. Boot the PC. If the PC is supplying power, the Tx power and both LINK LEDs will now light. After the PC boots, the transmitter Host LED lights, indicating communication between the PC and transmitter hub controller. Shortly after, the receiver Host LED lights indicating communication between the transmitter and receiver. If the PC is supplying transmitter power, the transmitter and receiver link LEDs light.
8. Connect USB peripherals to the USB Extender receiver using USB 2.0 compatible cables.
9. Power the various USB peripherals. As each peripheral is recognized by the PC, the appropriate USB Extender hub LED on the receiver front panel lights.

Mounting Options Overview

The 3 inches deep, 1 inch high, quarter rack width USB Extender transmitters and receivers can be placed on a tabletop, mounted on a rack shelf, or mounted under a desk or tabletop. The receiver can be mounted on a projector bracket.

The USB Extender AAPs can be wall or floor mounted in two-gang, 2.5 inch deep boxes. The Decora series can be mounted in a single-gang, 2.5 inch deep wall box.

Mounting details are included in [Mounting the USB Extender](#) in the reference section. Mounting instructions are included with each optional mounting kit.

CAUTION: Installation and service must be performed by authorized personnel only.

Connections

Transmitter Rear Panel

The Tx rear panel has the following connections.

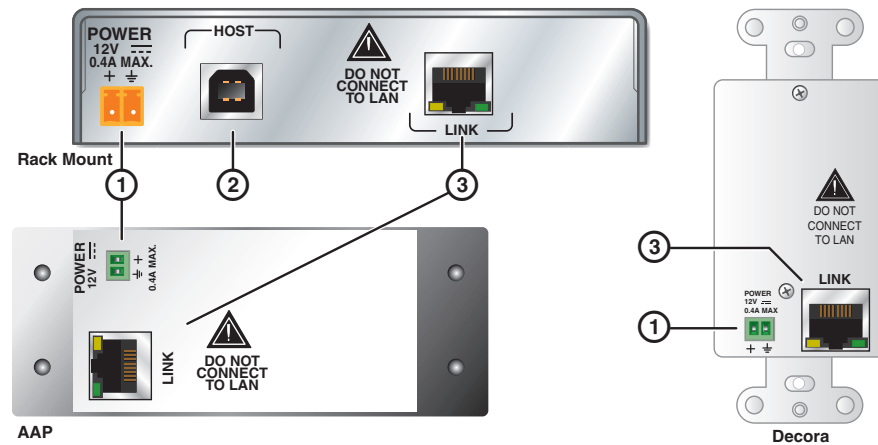


Figure 3. Transmitter (Tx) Rear Panel Connectors

- ① **Power input connector** — Connect an external power supply to this 2-pole, 3.5 mm captive screw connector. If the USB port of a connected PC or laptop is capable of providing USB power, an external supply for the transmitter is not required.

CAUTIONS:

- Always use a power supply supplied by or specified by Extron for use with the USB Extender Series. Use of an unauthorized power supply voids all regulatory compliance certification and may cause damage to the supply and the USB Extenders.
- Unless otherwise stated, the AC/DC adapters are not suitable for use in air handling spaces or in wall cavities. The power supply is to be located within the same vicinity as the Extron A/V processing equipment in an ordinary location, Pollution Degree 2, secured to the equipment rack within the dedicated closet, podium or desk.
- The installation must always be in accordance with applicable provisions of National Electrical Code ANSI/NFPA 70, article 75 and the Canadian Electrical Code part 1, section 16. The power supply shall not be permanently fixed to building structure or similar structure.

- ② **USB host connector (USB Extender Tx only)** — Connect a Type A-B female USB cable between this port and the USB output port of a PC or laptop. The USB Extender is USB 2.0 compliant and able to support data transfers of 480 Mbps (high speed), 12 Mbps (full speed), and 1.5 Mbps (low speed).

NOTE: AAP and Decora transmitters have the host connector on the front panel.

- ③ **Link (twisted pair) connector** — Connect the TP cable from the receiver Link connector (figure 4, item ⑤) to this RJ-45 female connector.

CAUTION: Do not connect this port to computer data or telecommunications networks.

NOTE: In order for the AAP or Decora models to fit in a junction box, the TP cables and RJ-45 connectors should not have a boot installed.

Receiver Rear Panel

The Rx (receiver) rear panel (see figure 4) has a DC power input, twisted pair link connection and also has four female USB Type A hub connectors. AAP and Decora receivers have the hub connectors on the front panel.

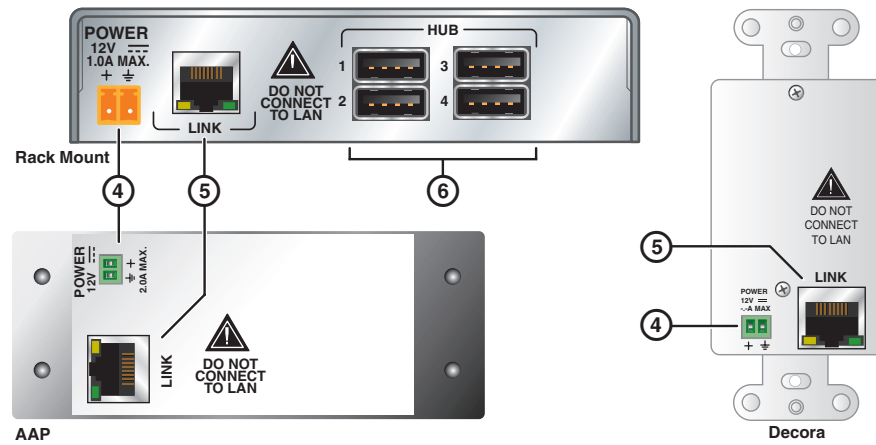


Figure 4. Receiver (Rx) Rear Panel Connectors

- ④ **Power input connector** — The receiver requires an external supply. Plug the included 12 VDC power supply into this 2-pole, 3.5 mm captive screw connector.
- ⑤ **Link (twisted pair) connector** — Connect the TP cable from the transmitter Link connector (figure 3, item ③) to this RJ-45 female connector.

CAUTION: Do not connect this port to a computer data or telecommunications network.

NOTE: In order for the AAPs to fit in a junction box, the TP cables and RJ-45 connectors should not have a boot installed.

- ⑥ **USB hub connectors (USB Extender Rx only)** — The built-in four port hub uses four female USB Type A connectors. The connections are USB 2.0 compatible, providing +5 VDC at up to 500 mA to connected USB peripherals requiring power.

See [TP Cable Termination on page 7](#), to properly wire the RJ-45 connectors.

Operation

Transmitter Front Panel Indicators

The transmitters have three LED indicators on the front panel. The AAP and Decora transmitters also include a female USB mini-type B port.

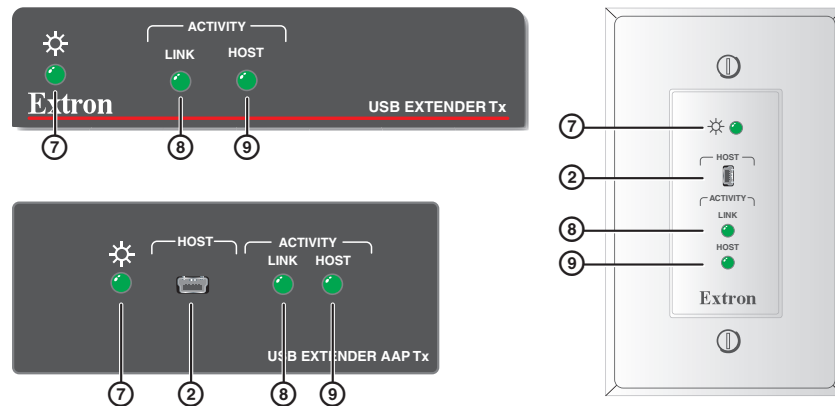


Figure 5. Front Panel Indicators, USB Extender Transmitters

- ② **USB Host connector (AAP and Decora Tx only)** — Connect a Type A male to mini Type B male USB cable between this port and the USB output port of a PC or laptop. The USB Extender is USB 2.0 compliant and able to support data transfers of 480 Mbps (high speed), 12 Mbps (full speed), and 1.5 Mbps (low speed).
- ⑦ **Power LED** — This front panel LED lights to indicate the unit is receiving power.
- ⑧ **Link LED** — Lights when the transmitter and receiver are successfully connected together by the twisted pair cabling and both transmitter and receiver are powered.
- ⑨ **Host Activity LED** — Blinks when the transmitter is powered and begins communicating with the host PC.

Receiver Front Panel Indicators

All receivers have a power, link, and host indicator LED on the front panel (similar to the transmitters) and also have four LEDs associated with the four USB hub ports. In addition, the front panel of the USB Extender Rx AAP and Decora includes four female Type A USB ports.

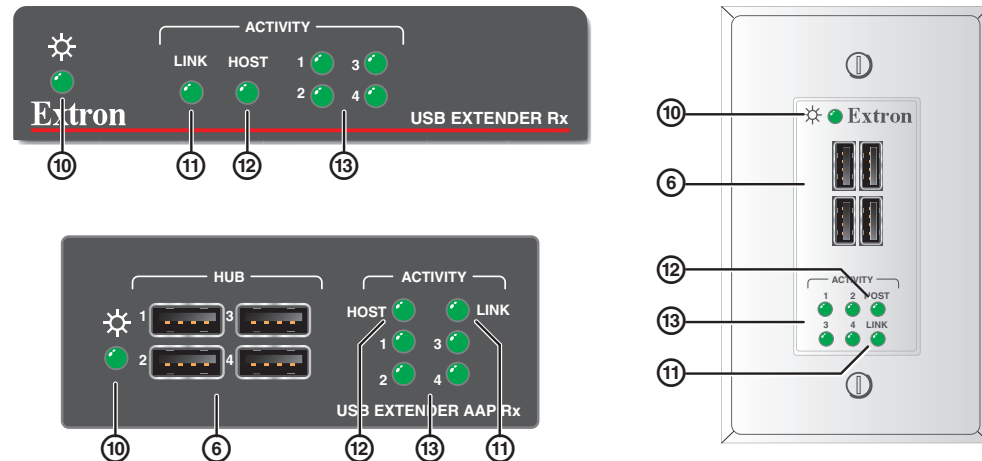


Figure 6. Front Panel Indicators, USB Extender Receivers

- ⑥ **USB Hub connectors (AAP and Decora Rx only)** — These female USB Type A connectors are used for the built-in four port hub. The connections are USB 2.0 compatible, providing +5 VDC at up to 500 mA to connected USB peripherals requiring power.
- ⑩ **Power LED** — Lights to indicate the device is receiving power.
- ⑪ **Link LED** — Lights when the transmitter and receiver are successfully connected together by the twisted pair cabling and both transmitter and receiver are powered.
- ⑫ **Host Activity LED** — Blinks when both the transmitter and receiver are powered, both are connected by the twisted pair cable, and the receiver is communicating with the host PC.
- ⑬ **Hub Activity LEDs** — A single LED for each port lights when the peripheral on the associated USB port has been recognized by the host PC.

Cabling and Setup

To ensure proper operation, the transmitter, receiver, USB host, and USB peripherals must be connected properly and in the sequence described below. Connections are the same regardless of which models (Extender, Extender AAP or Decora) are being installed.

NOTE: If the USB host is capable of powering the transmitter (0.4 A maximum), the external supply for the transmitter is not required.

Power down the USB host PC or laptop that will be connected to the transmitter and all peripherals and devices that will be connected to the receiver.

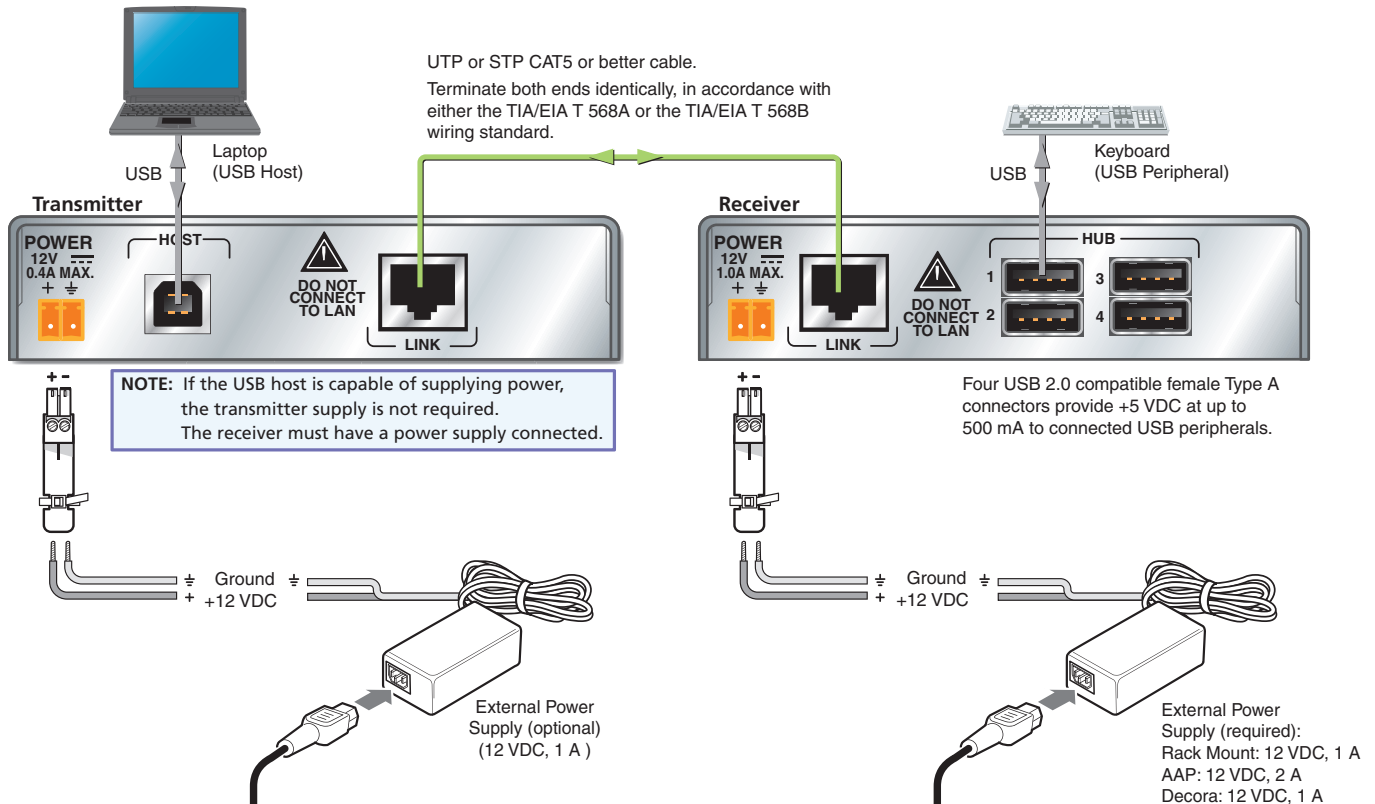


Figure 7. USB Extender Connection Guide with Two External Supplies

If an external supply powers the transmitter:

1. Connect twisted pair cable between the USB Extender transmitter and receiver.
2. Connect one included power supply to the USB Extender receiver and one to the transmitter, then apply power to both. The Power LEDs on the receiver and transmitter light.
Additionally, with both units powered, the Link LEDs light to indicate connectivity on the twisted pair link.
3. Connect a Type A-B USB cable (Type A male to mini Type B male for AAP and Decora Tx) from the USB host to the USB Extender transmitter.
4. Apply power to the USB host. After the host has booted, the transmitter Host LED lights to indicate communication between the host and transmitter. Shortly after, the Host LED on the receiver lights, then blinks to indicate the host is communicating with the hub controller (USB Extender receiver).
5. Connect USB peripherals (keyboard, mouse, scanner, printer, or other USB devices) to the receiver. As each peripheral is recognized by the host, the respective USB hub port LED on the receiver front panel lights.

If a host PC or laptop powers the transmitter:

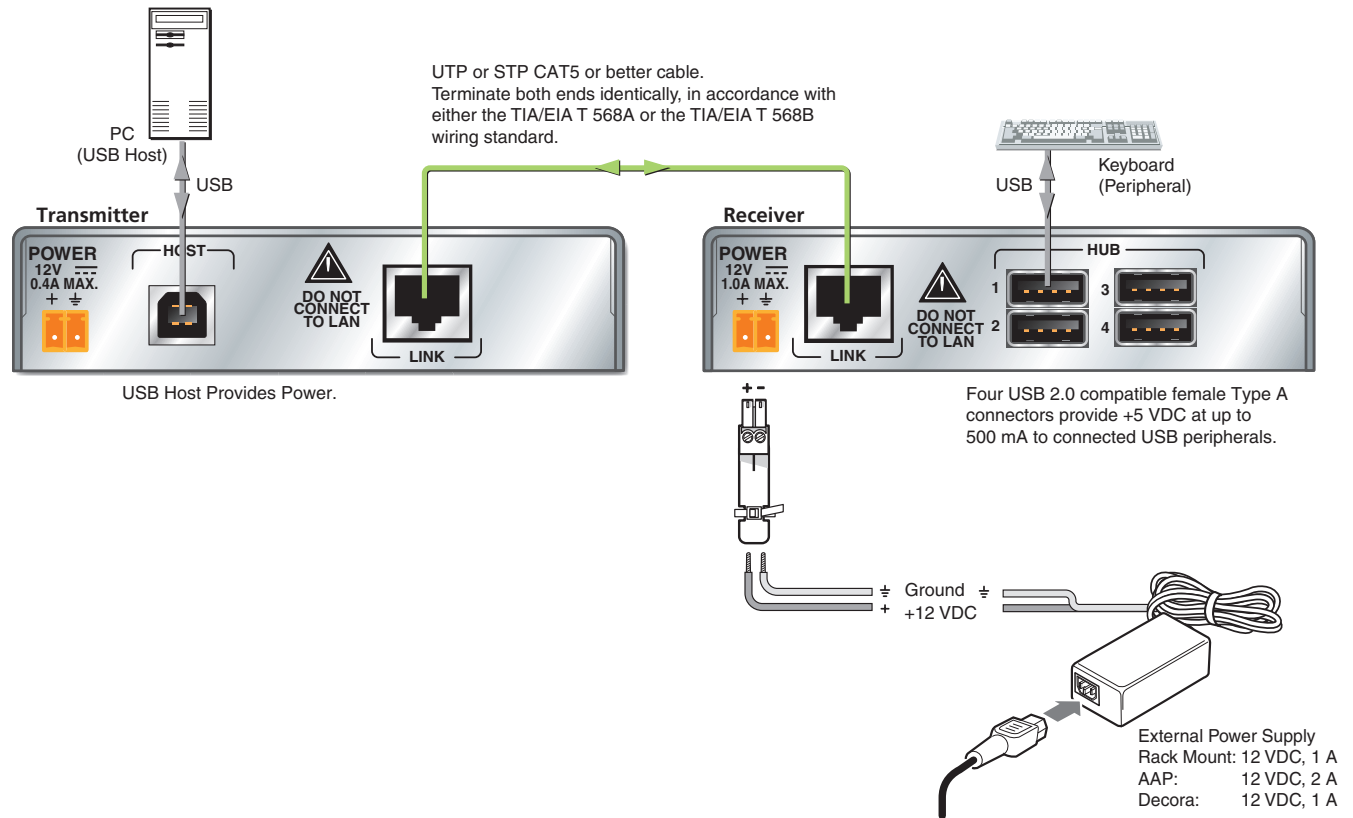


Figure 8. USB Extender Connection Guide with Host Supply

1. Connect twisted pair cable between the USB Extender transmitter and receiver.
2. Connect the included power supply to the USB Extender receiver and apply power. The Power LED on the receiver lights.

NOTE: The transmitter Power LED and both Link LEDs remain dark.

3. Connect a Type A-B USB cable (Type A male to mini Type B male for AAP and Decora Tx) from the USB host to the USB Extender transmitter.
4. Apply power to the USB host. When it boots up, the power LED on the transmitter and the link LEDs on both transmitter and receiver light.

Once the host has booted, the transmitter Host LED lights to indicate communication between the host and transmitter. Shortly after, the host LED on the receiver lights, then blinks to indicate the host is communicating with the hub controller (USB Extender receiver).

5. Connect USB peripherals (keyboard, mouse, scanner, printer, or other USB devices) to the receiver. As each peripheral is recognized by the host, the respective USB hub port LED on the receiver front panel lights.

System Operation

No drivers are required for a host to function with the USB Extenders. The transmitter is detected by Windows and appropriate USB drivers are loaded. Certain USB peripherals, such as gaming keyboards, USB interactive whiteboards, scanners, printers, and similar devices, require specific drivers to be installed on the PC. See the USB device installation instructions or the peripheral manufacturer website to obtain drivers.

Once the transmitter, the receiver, the PC or USB host, and peripherals are connected, have the appropriate drivers loaded, and are powered up, the system is fully operational. If problems are encountered, ensure all cables are routed and connected properly and the latest drivers for each peripheral are installed.

Troubleshooting

USB signals are generally very reliable but are susceptible to bad connections or cables that are too long. The TP cable can have the same issues. To avoid the loss of data and communications, follow these guidelines:

- The USB cable on the transmitter host connection or the receiver hub ports should not exceed 10 feet (3 m).
- When connecting the host or peripherals, use only cable designed for USB signals.
- Avoid or limit the use of adapters.
- The USB Extender works as described in point-to-point applications. Do not use additional adapters, patch panels, or couplers with the host USB cables, hub USB cables, or twisted pair cables. Additional links in the signal chain can result in the reduction of signal integrity and overall cable length performance.

When properly connected and operating, both transmitter and receiver Power LEDs, Link LEDs and Host LEDs are lit. The hub LED for each connected peripheral recognized by the host PC is also lit.

Front panel LEDs may also be useful for troubleshooting. The following table outlines operating details indicated by the LEDs.

	Transmitter (Tx)		Receiver (Rx)	
LED Indicator	On	Off	On	Off
Power	12 VDC supply is connected and operating properly, or host is properly supplying power.	12 VDC supply is not connected or is defective. If a transmitter supply is not being used, USB host is either not on or not providing power, or the USB cable is disconnected.	12 VDC supply is connected and operating properly.	12 VDC supply is not connected or defective.
Link	Both transmitter and receiver have power and TP cable is connected properly.	If both Power LEDs are on, the TP cable is not connected or is improperly wired. If a transmitter supply is not being used, USB host is either not on or is not providing power.	Both transmitter and receiver have power and TP cable is connected properly.	If both Power LEDs are on, the TP cable is not connected or is improperly wired. If either Power LED is off, see the Power LED troubleshooting instructions above.
Host	When transmitter power LED is on, lights when communication with host PC is established.	If transmitter power LED is on, USB cable is not connected. LED blinks if transmitter is not communicating with receiver.	Lights when communication with host PC is established.	Host USB port is not connected or host is not communicating.
Hub	N/A	N/A	Lights when the peripheral on the USB port has been recognized by the host PC.	Peripheral on the USB port has not been recognized or is improperly connected.

Table 1: System Troubleshooting

Reference Information

This section provides information on the following subjects:

- **Specifications**
- **Part Numbers and Accessories**
- **TP Cable Termination**
- **Mounting the USB Extender**

Specifications

USB

USB standards	USB 2.0, USB 1.1, USB 1.0 compatible
USB data rates.....	Low speed (1.5 Mbps), full speed (12 Mbps), high speed (480 Mbps)
Signal transmission distance	With CAT 5/5e/6/7 cable: 450' (135 m)

USB host — Tx units

Number/signal type	1 USB (supports USB 2.0, 1.1, 1.0 speeds)
Connectors	
USB Extender Tx	1 female USB type B
USB Extender AAP Tx, USB Extender D Tx	
.....	1 female mini USB type B

Interconnection between transmitter and receiver

Connectors	1 female RJ-45 per unit
Termination standards	TIA 568A or TIA 568B
Signal transmission distance	With CAT 5/5e/6/7 cable: 450' (135 m)

NOTE: The transmission distance varies depending on the type of cable used in the system.

USB hub — Rx units

Number/signal type	(1) 4-port USB hub
Connectors	4 female USB type A

General

Power supply.....	External
	Input: 100-240 VAC, 50-60 Hz
	Output: 12 VDC, 1 A
Power input	
Transmitters	12 VDC, 0.4 A
Receivers	12 VDC, 1.0 A
Temperature/humidity	Storage: -40 to +158 °F (-40 to +70 °C) / 10% to 90%, noncondensing
	Operating: +32 to +122 °F (0 to +50 °C) / 10% to 90%, noncondensing

Cooling

USB Extender Tx/Rx.....	Convection, no vents
USB Extender AAP Tx/Rx, USB Extender D Tx/Rx	Convection, vents on top

Mounting

Rack mount

USB Extender Tx/Rx	Yes, with optional rack shelf or rack mounting brackets
USB Extender AAP Tx/Rx, USB Extender D Tx/Rx	No

Furniture or wall mount

USB Extender Tx/Rx	Yes, with optional mounting kits
USB Extender AAP Tx/Rx.....	Yes, with optional mounting frame or Extron product with AAP openings
USB Extender D Tx/Rx.....	Wall or furniture mountable in a 1 gang Decora®-style opening

Enclosure type..... Metal

Enclosure dimensions

USB Extender Tx/Rx.....	1.0" H x 4.3" W x 3.0" D (2.5 cm H x 10.9 cm W x 7.6 cm D) (Depth excludes connectors.)
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USB Extender AAP Tx/Rx

Faceplate	1.4" H x 3.5" W x 0.1" D (3.5 cm H x 8.9 cm W x 0.3 cm D) (double space AAP plate)
-----------------	---

Device.....	1.4" H x 2.5" W x 1.4" D (3.5 cm H x 6.4 cm W x 3.6 cm D) (Depth excludes connectors and pigtail. Allow at least 1.6" (4.1 cm) depth in the wall or furniture.)
-------------	---

USB Extender D Tx/Rx

Faceplate	2.6" H* x 1.3" W x 0.1" D (6.6 cm H* x 3.3 cm W x 0.3 cm D) (Fits the opening in a 1 gang Decora®-style wallplate.) *Overall height is 4.1" (10.4 cm) including mounting tabs.
-----------------	--

Device.....	1.4" H x 2.5" W x 1.4" D (3.5 cm H x 6.4 cm W x 3.6 cm D) (Depth excludes connectors and pigtail. Allow at least 1.6" (4.1 cm) depth in the wall or furniture.)
-------------	---

Product weight..... 0.25 lbs (0.1 kg)

Shipping weight..... 1 lb (<1 kg)

Vibration..... ISTA 1A in carton (International Safe Transit Association)

Regulatory compliance

Safety	CE, c-UL, KCC, UL
EMI/EMC	CE, C-tick, FCC Class A, ICES, VCCI Class A
Environmental.....	Complies with the appropriate requirements of RoHS, WEEE

MTBF 30,000 hours

Warranty..... 3 years parts and labor

NOTE: All nominal levels are at $\pm 10\%$.

NOTE: Specifications are subject to change without notice.

Part Numbers and Accessories

Included Parts

These items are included in each order for a USB Extender Tx or Rx:

Description	Part number
USB Extender Tx transmitter -or- USB Extender Rx receiver	60-871-12 60-871-22
USB Extender AAP Tx transmitter, black white	60-870-12 60-870-13
USB Extender AAP Rx receiver, black white	60-870-22 60-870-23
USB Extender Decora Tx transmitter, white	60-1252-13
USB Extender Decora Rx receiver, white	60-1252-23
USB Extender Set up Guide	
12 VDC, external power supply	
Rubber feet (4)	

NOTE: A power supply is included with each transmitter and each receiver.

Accessories

Description	Part number
RSF 123, Rack Shelf Kit for 3.5 inch deep products	60-190-20
RSB 123, Basic Rack Shelf for 3.5 inch deep products	60-604-21
RSU 126, Universal Rack Shelf for 6 inch deep products	60-190-10
RSB 126, Basic Rack Shelf for 6 inch deep products	60-604-11
RSU 129, Universal Rack Shelf for 9.5 inch deep products	60-190-01
RSB 129, Basic Rack Shelf for 9.5 inch deep products, Gray	60-604-02
MBD 129, Through-Desk Mounting Kit for 1/4 or 1/2 rack width products	70-077-02
MBU 123, Under-Desk Mount Kit for 1/8 and 1/4 rack width products	70-212-01
PMK 100, Pole Mount Kit for one 1/4 rack width product	70-217-01
PMK 200, Pole Mount Kit for 1/4 or 1/2 rack width products	70-077-04
PMK 300 projector mount kit	70-374-01
PMK 350 low profile projector mount kit	70-563-03
Two-gang junction box	980084
One-gang junction box	980130

TP Cable Termination

- NOTES:**
- RJ-45 termination with CAT 5, CAT 5e, CAT 6, CAT 6e, and CAT 7 cable must comply with the TIA/EIA T 568A or TIA/EIA T 568B wiring standard for all connections.
 - The transmitter and receiver pair work with unshielded twisted pair (UTP) or shielded twisted pair (STP) cables; but to ensure FCC Class A and CE compliance, STP cables are required.
 - Terminate both ends of the cable identically, in accordance with either the **TIA/EIA T 568A** or the **TIA/EIA T 568B** wiring standard.

Figure 9 lists the recommended termination of TP cables with RJ-45 connectors.

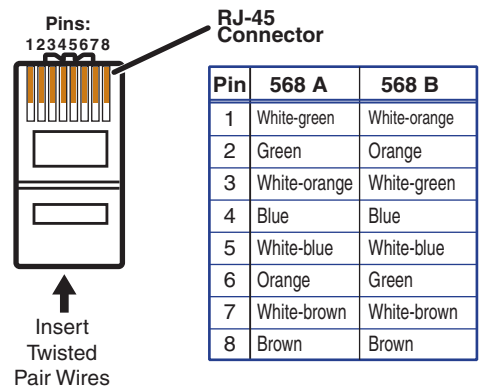


Figure 9. TP Cable Termination

- NOTE:** Do not use Extron UTP23SF-4 Enhanced Skew-Free™ A/V UTP cable to link the transmitter and receiver. Skew-free A/V cable was designed for most Extron TP transmitter and receiver applications, but the USB Extender Series does not work properly with this cable.

Mounting the USB Extender

CAUTION: Installation and service must be performed by authorized personnel only.

The three inch deep, one inch high, quarter rack width USB Extender transmitters and receivers can be placed on a tabletop, mounted on a rack shelf, or mounted under a desk or tabletop. The receiver can be mounted on a projector bracket. Consult the individual mounting kits for installation instructions.

Tabletop Placement

Affix the four included rubber feet to the bottom of the unit and place it in any convenient location.

Rack Mounting

UL Guidelines for Rack Mounting

The following Underwriters Laboratories (UL) guidelines are relevant to the safe installation of these products in a rack:

- 1. Elevated operating ambient temperature** — If the unit is installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient temperature. Therefore, install the equipment in an environment compatible with the maximum ambient temperature (Tma: +122 °F, +50 °C) specified by Extron.
- 2. Reduced air flow** — Install the equipment in the rack so that the equipment gets adequate air flow for safe operation.
- 3. Mechanical loading** — Mount the equipment in the rack so that uneven mechanical loading does not create a hazardous condition.
- 4. Circuit overloading** — Connect the equipment to the supply circuit and consider the effect that circuit overloading might have on overcurrent protection and supply wiring. Consider the equipment nameplate ratings when addressing this concern.
- 5. Reliable earthing (grounding)** — Maintain reliable grounding of rack-mounted equipment. Pay particular attention to supply connections other than direct connections to the branch circuit (such as the use of power strips). For optional rack mounting, mount the transmitter or receiver on any of the following rack shelves:

Rack Mounting Procedure

The unit can be mounted on any of these optional rack systems, including:

- **RSF 123**, Rack Shelf Kit for 3.5 inch deep products (part number **60-190-20**)
- **RSB 123**, Basic Rack Shelf for 3.5 inch deep products (part number **60-604-21**)
- **RSU 126**, Universal Rack Shelf for 6 inch deep products (part number **60-190-11**)
- **RSB 126**, Basic Rack Shelf for 6 inch deep products (part number **60-604-11**)
- **RSU 129**, Universal Rack Shelf for 9.5 inch deep products (part number **60-190-01**)
- **RSB 129**, Basic Rack Shelf for 9.5 inch deep products, gray (part number **60-604-02**)

To mount the USB Extender on a rack shelf, follow the instructions provided with the shelf accessories.

Under-furniture Mounting

The unit can be mounted under a horizontal surface using an optional **MBU 123**, Under-Desk Mount Kit for one-eighth and quarter rack width products, (part number **70-212-01**). To mount the USB Extenders follow the instructions provided with the mounting kit.

Through-furniture Mounting

The transmitter or receiver can be mounted through a desk or other furniture using an optional Extron **MBD 129**, Through-Desk Mounting Kit for quarter or half rack width products, part number **70-077-02**. To mount the USB Extenders follow the instructions provided with the mounting kit.

Projector Mounting

The receiver can be mounted on a projector bracket using either of the following optional Extron projector mounting kits:

- PMK 300 multi-product pole mount kit (part number **70-374-01**)
- PMK 350 low profile, multi-product pole mount kit (part number **70-563-03**)

To mount the USB Extenders on a projector mount, follow the instructions provided with the mounting kit.

Wall mounting

The USB Extender AAP and Decora transmitter and receiver can be installed in an electrical wall box.

The installation must conform to national and local electrical codes and to the wall plate size requirements.

The following Underwriters Laboratories (UL) guidelines pertain to the installation of the wall mount transmitters and receivers into a wall or furniture.

1. Do not connect these units to a centralized DC power source or use beyond their rated voltage range.
2. These units must be installed in UL listed junction boxes.
3. These units must be installed with conduit in accordance with National Electrical Code.

Prepare the site and install the wall box

- Choose a location that allows cable runs without interference.
- Allow enough depth for both the wall box, the TP cable and power supply wiring. The box should be at least 2.5 inches (6.35 cm) deep to accommodate the connectors and cables.
- Run the TP and power supply wires into the wall, furniture, or conduits before installing the wall plate.

NOTE: The Decora series is designed to mount in a standard single-gang wall box.

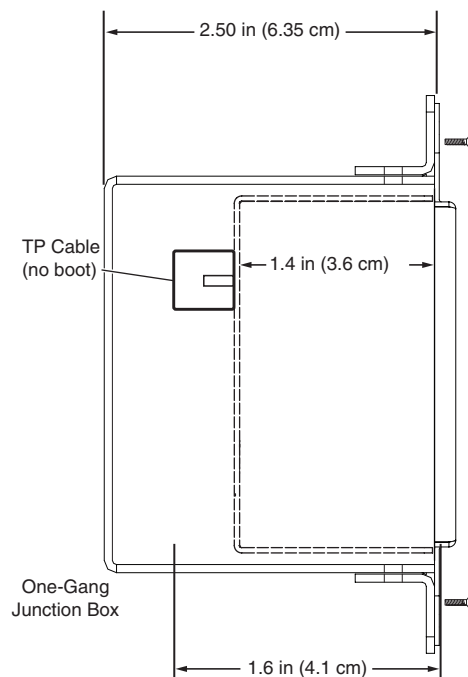


Figure 10. Wall Box Depth Profile, AAP and Decora

Final installation

Test the USB Extenders for proper operation, then:

1. At the power outlet (not the extender), unplug the power supply.
2. Mount the transmitter or receiver into the wall box.
3. At the power outlet, reconnect the power supply.

Extron Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

**USA, Canada, South America,
and Central America:**

Extron Electronics
1001 East Ball Road
Anaheim, CA 92805
U.S.A.

Japan:

Extron Electronics, Japan
Kyodo Building, 16 Ichibancho
Chiyoda-ku, Tokyo 102-0082
Japan

**Europe, Africa, and the Middle
East:**

Extron Europe
Hanzeboulevard 10
3825 PH Amersfoort
The Netherlands

China:

Extron China
686 Ronghua Road
Songjiang District
Shanghai 201611
China

Asia:

Extron Asia
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363
Singapore

Middle East:

Extron Middle East
Dubai Airport Free Zone
F12, PO Box 293666
United Arab Emirates, Dubai

This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions, or modifications were made to the product that were not authorized by Extron.

NOTE: If a product is defective, please call Extron and ask for an Application Engineer to receive an RA (Return Authorization) number. This will begin the repair process.

USA: (714) 491-1500

Asia: 65.6383.4400

Europe: 31.33.453.4040

Japan: 81.3.3511.7655

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

Extron Electronics makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.

Extron Headquarters +1.800.633.9876 (Inside USA/Canada Only) Extron USA - West +1.714.491.1500 +1.714.491.1517 FAX	Extron Europe +800.3987.6673 (Inside Europe Only) +31.33.453.4040 +31.33.453.4050 FAX	Extron Asia +800.7339.8766 (Inside Asia Only) +65.6383.4400 +65.6383.4664 FAX	Extron Japan +81.3.3511.7655 +81.3.3511.7656 FAX	Extron China +4000.398766 Inside China Only +86.21.3760.1568 +86.21.3760.1566 FAX	Extron Middle East +971.4.2991800 +971.4.2991880 FAX	Extron Korea +82.2.3444.1571 +82.2.3444.1575 FAX	Extron India 1800.3070.3777 Inside India Only +91-80-3055.3777 +91 80 3055 3737 FAX
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